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## DEPARTMENTS.

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### SOLUTIONS OF PROBLEMS.

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#### ARITHMETIC.

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100. Proposed by CHAS. C. CROSS, Libertytown, Md.

I bought stock at 4% discount, and sold it at  $2\frac{1}{2}\%$  premium, paying a brokerage in both cases of  $\frac{1}{4}\%$ . If my net profits were \$130, what was my investment? (Solve by Arithmetic).

I. Solution by W. F. BRADBURY, A.M., Head Master Cambridge Latin School, Cambridge, Mass., and M. E. GRABER, Tiffin, Ohio.

$$4\% + 2\frac{1}{2}\% - \frac{1}{4}\% \text{ (brokerage)} = 6\%.$$

That is, he made \$6 on every \$100 he invested.  $130 \div 6 = 21\frac{2}{3}$ .

He bought  $21\frac{2}{3}$  shares of \$100 each, or \$2166 $\frac{2}{3}$  worth of stock.

But it cost him  $3\frac{1}{4}\%$  below par.

$$\$2166\frac{2}{3} \times 0.96\frac{1}{4} = \$2085.415.$$

Solved in a similar manner by P. S. BERG and W. H. DRANE.

II. Solution by M. A. GRUBER, A. M., War Department, Washington, D. C.

"In both cases" is a dubious expression. If the brokerage in the two transactions was *together*  $\frac{1}{4}\%$ , then the net gain on a dollar =  $.04 + .02\frac{1}{2} - .00\frac{1}{4} = .06\frac{1}{4}$ , and the investment =  $\$130 \div .06\frac{1}{4} = \$2080$ .

But if the brokerage in *each* transaction was  $\frac{1}{4}\%$ , then the net gain on a dollar =  $.04 + .02\frac{1}{2} - .00\frac{1}{2} = .06$ ; and the investment =  $\$130 \div .06 = \$2166.\bar{6}$ .

III. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa., and ALOIS F. KOVARIK, Instructor in Mathematics, Decorah Institute, Decorah, Iowa.

Let \$100 = 1 share.

$$4\% - \frac{1}{4}\% = 3\frac{3}{4}\% ; 100\% + 2\frac{1}{2}\% - \frac{1}{4}\% = 102\frac{1}{4}\% . \quad 100\% - 3\frac{3}{4}\% = 96\frac{1}{4}\% .$$

$$\$100 \div .96\frac{1}{4} = \$103.896.$$

$$\$103.896 \times 1.02\frac{1}{4} = \$106.23366.$$

$$\$106.23366 - \$100 = \$6.23366, \text{ gain on one share.}$$

$$\$130 \div \$6.23366 = 20.85452 \text{ shares.}$$

$$20.85452 \times \$100 = \$2085.452, \text{ amount invested.}$$

101. Proposed by F. P. MATZ, Sc. D., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pa.

A man gained  $m=3\%$  on his money, in July; and, in August, lost  $n=2\%$ . What per cent. of his money July 1st is his money September 1st?

I. Solution by P. S. BERG, Principal of Schools, Larimore, N. D., and JOHN F. TRAVIS, Student in Ohio State University, Columbus, Ohio.

If 100% is his money on July 1st, then 103% is his money August 1st, and 98% of 103% or 100.94% is his money on September 1st.

Therefore his money September 1st is 100.94% of his money July 1st.